MESSAGE FROM THE DEPARTMENT HEAD

I have been honored to serve as the head of the Dairy Science Department for 10 years, and as a faculty member for 26 years. Each passing year I have been fortunate to witness numerous changes within the department, the college and the university. Each of these changes has been strategically designed to address contemporary and future needs within current constraints. All through these changes, the mission of the department “to help create a prosperous future for the dairy industry of South Dakota, the region, nation, and world” has remained at the forefront. To help achieve this, in 2012 we welcomed two new faculty members, Dr. Hasmukh Patel in Dairy Manufacturing, and Dr. Jill Anderson in Dairy Production. We also welcomed two new staff members, twenty six new undergraduate students and eight new graduate students. To fully utilize our new teaching and dairy plant facilities, our goal is to recruit more students at both, undergraduate and graduate levels. Our faculty members have excelled in their areas; Dr. Metzger was recognized as a top researcher in the College of Agriculture and Biological Sciences and also received the Gamma Sigma Delta research award, Dr. Casper received a national research award for forage research, Dr. Jill Anderson received a national award for her graduate research, Dr. Metzger was recognized as coach of the year for dairy products judging. Faculty members were invited to assist in various projects, e.g., Dr. Garcia was invited to Saudi Arabia for expert advice, several faculty members served on boards of national and local organizations. Faculty members actively sought external funds for conducting research and supporting graduate students, they also not just taught scheduled classes, but sought ways to design and reorganize classes to cover new, relevant topics, using updated teaching methods. Extension faculty integrated their programs into the newly organized SDSU Extension and assisted producers in the areas of nutrition, health, milk quality, labor management, etc. Thus, the diversity of activity of faculty and staff is truly impressive and humbling. While the new dairy plant has been operational for over a year we continue to welcome new supporting members; in 2012, Saputo Cheese and bel brands USA joined the Jackrabbit Dairy Council. We were pleased to welcome Francine Moudry, project manager of bel brands as she embarked on an exciting project of building a new $100 million cheese plant. As we look at 2013 and beyond, we will shortly engage in the development of a new strategic plan on the university and college planning phases are completed in spring. Further, we are already engaged in developing plans for significantly upgrading our dairy research and training facility for our dairy production teaching and research programs. As we look forward to our new directions we thank you for your past support and invite your input for our future endeavours.

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2012 Dairy Club students reminiscing the past.
NEW FACULTY AND STAFF

Thomas Vander Wal joined the Department as Agricultural Foreman and is responsible for feeding cows and replacing heifers and overall maintenance at the Dairy Research and Training Facility. Tom holds an Associate’s Degree in Farm Operations and Management/ Dairy Farming from Ridgeview College in Willmar, MN. Prior to SDSU, Tom was employed at Farmer’s Implement in Brookings.

VISITORS

Randy Gross, former President of Holstein Association, USA and retired Assistant Branch Manager of Northwest Farm Credit Services of Washington State, served as co-instructor in the Dairy Breeding and Production, Dairy Farm Management, and Dairy Judging classes.

Randy’s wealth of experience was most valuable to our students.

Walt Wojciechowski, alumnum and retired CEO of Michigan Milk Producers served as guest lecturer in several of our classes. Walt was also the recipient of a distinguished alumnus award of the SDU Alumni Association in 2011.

Xiaoxiang Wang, an entrepreneur from China spent two weeks in the Dairy Science Department learning how to make ice cream. Howie Bonnenmeyer, instructor, provided one-on-one instruction to Mr. Wang through a translator. The specialized workshop included dairy lectures and hands-on activities in the Dairy Plant and lab. Mr. Wang plans on establishing an ice cream manufacturing facility in China.

Other visitors included numerous alumni and industry guest speakers in classes and for special seminars and to discuss research opportunities. In addition, Elle Saada and Kurban Yar spent the summer with us as visiting students from ENSAT, France, and Mart University, Turkey, respectively.

JUDGING ACTIVITIES

DAIRY CATTLE EVALUATION & DRAFT CATTLE

Our Dairy Cattle Judging team consisting of Alysha Vander Wal, Chelsey Johnson and Christopher Schulte participated in the North American International Livestock Dairy Judging contest in Louisville, Kentucky. Stephen Grego was the coach. There were twenty teams in the collegiate division with SDSU placing thirteenth. Chelsey Vander Wal placed third in Holsteins and Chris Schulte placed 25th overall. Earlier in the year, our team participated in the annual Accelerated Genetics’ Intercollegiate Dairy Cattle Judging Contest in Virginia, Wisconsin.

The senior team consisted of Chelsey Johnson, Alysha Vander Wal and Chris Schulte. The team consisted of Matthew Holdorf, Rachel Adzen. Eighteen teams were present representing 41 colleges and universities. The University of Minnesota placed first and SDSU was placed fifth overall.

The Junior Team placed fourth in Guernsey and the Senior Team placed first in Holstein. Chelsey Johnson placed fifth individual overall and seventh in Guernsey. The team placed fifth in Jersey, fourth in Milking Shorthorn, Overall, Alysha Vander Wal placed seventh and Chris Schulte was ninth. Overall, the SDSU team placed third in the contest. The team also attended the Southwestern Exposition and Livestock Show in Fort Worth, Texas. The team consisted of Chelsey Johnson, Chalise Schulte, Sara Insing, and Alysha Vander Wal and was coached by Steve Grego and Megan Smith. The team placed seventh in Brown Swiss and Jersey classes. Chris Schulte and Alysha Vander Wal placed fifth and 10th, respectively in Jersey, Alysha placed second in Brown Swiss. In overall individual placing, Alysha and Chris were 22nd and 24th respectively. Alysha placed 15th and Chelsey 18th in overall individual placements. Oklahoma State University hosted judging practice prior to the contest in Fort Worth. At this practice team from Kansas State University and North Dakota State University also participated.

Four Dairy Science students traveled to Rhode Island, Virginia, to participate in the Eleventh Annual North American Intercollegiate Dairy Challenge (NAIDC). The UC Davis Dairy Challenge Team consisted of Megan Forst, Kaitlin Horlbeck, Mitch Ober and Megan Rice. The team consisted of 128 students from 32 universities and colleges across the United States and Canada. Associate Professor Karen Metzger, Assistant Professor David Casper, Assistant Farm Manager Melissa Schmitt, and Farm Manager Steve Grego helped coach the team. The two-day competition began with a walk-through of an operating dairy, analysis of farm data, and question and answer session with farm owners. Then each team developed recommendations for nutrition, reproduction, milking procedures, animal health, housing, and financial management. The teams presented their recommendations in front of a panel of judges who were evaluating by a panel of five judges—dairy producers, veterinarians, farm finance specialists, and industry personnel. Team members commented that the contest increased their understanding of other dairy experiences. The knowledge and hands-on experience gained through Dairy Challenge will be used by many participants for years to come.

In the year, five SDSU students traveled to St. Joseph, Missouri, to participate in the 10th Annual Midwest Regional Dairy Challenge. SDSU students were mixed from students with 19 other Midwest universities and colleges in the teams of four or five to assess all aspects of a working dairy farm and present recommendations to a panel of judges and the dairy farm owners. Representing SDSU were Megan Forst, Mitch Ober, Megan Rice, and Ana Schwee.

Dairy Products

Our Dairy Products Judging Team placed first in all Products at the Collegiate Dairy Products Evaluation Contest for the fifth consecutive year. SDSU teams have won the national championship 20 times in the 37 year history of the contest. The 2012 team placed first in milk and Cheddar cheese, second in ice cream, third in cottage cheese, fourth in butter, and fifth in both milk punch and cheese curds from 17 universities in the U.S. and Canada participated in the contest. Team members were Austin Osce, Cassandra Holleman, Alex Lee, and Laura Moyle.

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FEHIEFERS FOR STATE

The 2012 Heifers for State was held in conjunction with the annual South Dakota Central Plains Fall Sale on October 29, 2012, at the Swift Creek in Brookings. Dairy Club members worked all week to set up the arena, receive cattle, prepare, feed and milk them. On the day of the sale they showed the cattle to buyers. Approximately 140 animals were sold at the sale. Three producers also donated animals for the Heifers for State program. Donors included K.C. Dairy — Edward Kavanagh, Elkton, SD; and Marv and Joy Post, Yankton, SD. $2,350 were raised from the donated animals. This contribution will be used for supporting dairy education, research programs and providing scholarships to Dairy Science students at SDSU. The Heifers for State program started in 2006.
Kalscheur, K. F., Schingoethe, D. J. New uses of distillers grains products in dairy cattle feeding. 01/01/2009 to 12/31/2013. USDA/ARS. $25,000.

Kalscheur, K. F., Kalscheur, M. K. Development of modified milk protein concentrates and native casein concentrates that can be utilized as an alternative to rennet casein for cheese product applications. 09/01/2010 to 03/31/2012. Dairy Management Inc. $186,994.

Kalscheur, K. F. Kalscheur, M. K. The evaluation of novel probiotic dairy products rich in conjugated linoleic acid. 01/01/2008 to 05/31/2010. USDA-NIFA-HEC grant. $220,141.

Kalscheur, M. K. M. Renelt, T. Agricultural human resource management. 01/01/2012 to 12/31/2013. Dairy Management Inc. $37,656.


**MARK YOUR CALENDAR**

**I-29 Dairy Conference**
February 27-28, Best Western Ramkota Inn, Sioux Falls

**Central Plains Dairy Expo**
March 27-28, Convention Center, Sioux Falls

**2013 Dairy Science Scholarship Banquet**
Monday, April 1, at 6:00 p.m., SDSU Student Union.
Our students were again the beneficiaries of the generosity of many alumni, friends, and industry. At the spring 2012 banquet, 120 attendees witnessed the awarding of 95 scholarships and awards valued at $97,714.

*Sam Fuchs, Eureka, SD, Manufacturing
*Rachel Johnson, Russell, MN, Manufacturing
Leprino Foods, $4,000
Joseph Van Treeck, $1,300
Kirk Mears Memorial, $900
J. J. Ye, $500
John Anderson Memorial
I-29 Dairy Extension, $500
H. C. Olson, $450
David J. Schingoethe, $1,000
Davisco Foods Int’l, DuPont (2 @$1,000 each), $2,000
Derrall, $500
Dairy Connections, $1,000
Clyde Helsper Memorial, $1,000
Associated Milk Producers, Inc., $1,000
Agropur, Inc. Dairy Production, $500

Scholarships and awards valued at $91,714.

Kyle Fischer, New Ulm, MN, Production
Samantha Berg, Pipestone, MN, Manufacturing
Roxane Chapman, Winfred, SD, Production
Bethany Chapman, Winfred, SD, Production
Maxwell Henn, Norfolk, NE, Production
Jennifer Gunnink, Lake Benton, MN, Production
Nicole Hans, Wyanot, NE, Production
Nicole Neugebauer, Dimock, SD, Production
Laura Martin, Rochester, MN, Production
Matthew Holdvogt and Benjamin Choi, serve as student managers. Stephen Crego and Melissa Schmitz, manager and assistant manager, respectively managed the farm. Thomas Vander Wal joined the DRTF as Ag Foreman and took on the duties of feeding and maintenance. Farm research was enhanced recently with the purchase of a new Data Ranger.

Area Dairy Expo
Alumni, students, faculty of the Dairy Science Department participated in Central Plains Dairy Expo in Sioux Falls and the World Dairy Expo in Madison, WI. Faculty and students also participated in the Washington Pavillion Ag Day events in Sioux Falls, demonstrating various dairy activities to participants.

North Central Cheese Industries Association
Dr. Lloyd Mettger serves as Executive Secretary and Dr. Vikram Mistry as Advisor to the NCCIA. The annual meeting was held in Sioux Falls and included over 130 cheese makers and suppliers from the upper Midwest.

K-12 STUDENTS

Dairy Camp
The Dairy Club hosted the 9th annual Dairy Camp in June 2012 for youth ages 8-18. Activities for the 37 participants included a visit to a local commercial dairy, training on care of heifers, judging, visit to the SDSU dairy plant, making ice cream, cream and showing cattle, and entertainment. Participants showcased what they learned at a showmanship contest on the final day of the camp. Parents were invited to attend and Rand N gross served as a judge for the show.

High School Visits
More than 200 individuals in dairy farming improved their understanding of sustainability concepts at an I-29 Regional Dairy Conference held on Friday, October, and attended the Dairy Science Expo in Sioux Falls. Speakers from the United Kingdom, SDSU, Minnesota, Illinois, and Texas spoke on the theme “Future Global Dairy Issues.”

UPDATE: DAIRY RESEARCH & TRAINING FACILITY

Dairy Science at World Dairy Expo
The Dairy Science Department and the South Dakota Department of Ag jointly displayed a booth at the World Dairy Expo in Madison, WI, in October. The booth highlighted the dairy development efforts and dairy education and research activities and opportunities in South Dakota.

Applied Food Safety Education Lab Workshop IV
Joan Huybrechts-Baker from Nutrition and Health Sciences and Sanjeev Anand from Dairy Science jointly organized this USDA/HEC challenge grant workshop, for hands-on training in microbiological analytical procedures and virtual labs, at Biggs High School Science Lab, Pierre. Fifteen teachers participated in the workshop.

Food Safety Science Workshop
Joan Huybrechts-Baker from Nutrition and Health Sciences and Sanjeev Anand from Dairy Science jointly organized this USDA/HEC challenge grant workshop, for hands-on training in microbiological analytical procedures and virtual labs at SDSU.

Our dairy farm has approximately 150 certified and registered milking cows and a total of 300 animals. This includes about 50 Brown Swiss. The rolling herd average attained a record of just over 25,000 pounds per year. The herd is used for research projects primarily in the cattle nutrition area and also for teaching. In addition K-12 students also benefit from it through the Dairy Camp and cattle judging contests that are hosted at the farm. Matthew Holdvogt and Benjamin Choi served as student managers. Stephen Crego and Melissa Schmitz, manager and assistant manager, respectively managed the farm. Thomas Vander Wal joined the DRTF as the Ag Foreman and took on the duties of feeding and maintenance. Farm research was enhanced recently with the purchase of a new Data Ranger.
RESEARCH HIGHLIGHTS

**Faculty research activities are supported by the Agricultural Experiment Stations and external grants. The broad areas of research are as follows:**

**Structure-function Relationship of Milk Proteins and Design of Dairy Ingredients with Tailored Functionality, Improved Nutrition and Health Benefits**

Dr. Hanusha Paul, Lloyd Metzger, and Ronny Specker. 1) Improve our knowledge of structure-function relationship of milk proteins. 2) Provide link between food structure and bioavailability/nutrient delivery. 3) Improve understanding and provide insights for designing new dairy ingredients with improved nutrition and functionality.

**Improving Feed Efficiency through High Forage Rations as a Feeding Strategy to Increase the Profitability & Sustainability of Dairy Production**

Dr. David Casper. This research is intended to identify and evaluate methods to improve the feed efficiency of dairy cows through traditional forage quality and new forage hybrids that may come available for use in dairy cattle diets. Most evaluations will be as feeds for lactating cows, although some evaluations (e.g. specific nutrient profiles) may be with growing heifers or dry cows. Specific objectives for this project include: 1) Evaluate the nutritional composition and feeding value of highly digestible forages and new forage hybrids for maximum inclusion rate for feeding high forage diets to lactating dairy cows. Techniques will include ruminal fermentation with continuous culture fermenter system, measurement of gas production from ruminal fermentation and rational feeding methods of lactating dairy cows. 2) Evaluate the maximum forage inclusion rates for mid to late lactation dairy cows. Highly digestible forages could result in very high forage diets that will reduce the feed costs of these cows. 3) Evaluate the nutrient composition, dry matter digestibility, fiber digestibility, starch digestibility to accurately predict the feeding value of forages and new forage hybrids for dairy cattle.

**Safety and Quality Improvement of Milk and Cheese**

Dr. Sanjeev Anand. 1) Study the role of thermodynamic bacteria in influencing shelf-life of milk products such as cheese. Objective. 2) Reducing the cross contamination in dairy processing environments by controlling bacterial biofilms.

**Role of Exopolysaccharides-Producing Cultures in Biofilms**

Formation and as a Texturizing Agent

Dr. Ashraf Hassan, Vikram Garcia, and Sanjeev Anand. 1) Optimize manufacturing conditions for the production of 30% reduced fat and low fat Cheddar cheeses with characteristics similar to those in the full fat types using EPS-producing cultures. 2) Develop novel functional ingredients from whey containing exopolysaccharides. 3) Study the formation of biofilms on whey RO membranes as a cause of membrane fouling.

**Metabolic Relationships in Supply of Nutrients for Lactating Cows**

Dr. David Casper, David Schingoethe and Kenneth Kalscheur.

The long-term goal is to improve the efficiency of milk production, cow health and longevity, and thus promote environmental and economic sustainability in the U.S. dairy industry. The approach to achieve this goal is to systematically identify those biological and nutritional management processes that will provide the greatest improvements in milk production and sustainability of dairy systems.

**Improving Our Understanding of Feed Quality’s Impact on Milk Production and Sustainability of Dairy Enterprises**

Dr. Kenneth Kalscheur.

The purpose of this project is to develop decision support systems that address nutrition, management, environmental impacts, and economics of 1) calves and heifers and 2) lactating and dry cows.

**Manufacture of dairy based ingredients**

Dr. Lloyd Metzger. This project will focus on the manufacture of modified milk protein concentrates and their utilization as ingredients and will include several related research projects. The objectives of the projects are: 1) determine the impact of carbon dioxide injection on membrane performance, mineral content, and functionality of milk protein concentrate; and 2) evaluate the effectiveness of transglutaminase to modify the functionality of native casein concentrate and milk protein concentrate when they are used as ingredients in process cheese products and to evaluate the commercial feasibility of a novel process for producing a unique dairy based ingredient that is targeted for process cheese product applications.

**Use of Biofuel Coproducts to Improve Nutrient Utilization in Dairy Cattle**

Dr. Kenneth Kalscheur, David Schingoethe and Alvaro Garcia. This project examines nutrient utilization of dairy cattle fed diets using biofuel coproducts to reduce losses to the environment.